

# Owners Manual and Set-up Guide: Genesis ServoSub™ 4/8

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## A Message from Genesis

Congratulations! You are now the owner of one of the finest sub-woofers available for music and home theater systems.

The Genesis ServoSub™ 4/8 is a unique subwoofer with 4 ultra-fast 8" ribbed aluminum woofers and an integral 500W servo-controlled bass amplifier. When used to complement the Genesis 6.1c center channel, or any other center channel for that matter, the S4/8 adds body to the voice channel for home theater applications.

The hallmarks of the S4/8 are speed, delicacy and articulation. Hence, it is also the perfect partner to fast panel or electrostatic loudspeakers.

The S4/8 delivers bass frequencies as intended by the musical performer, or as intended by the movie director. This is what we call *absolute fidelity*™. In this case, we mean that the bass response of the speaker is completely faithful to the input signal. This is achieved by servo control of the woofer cone.

The S4/8 plays as loudly and deeply as much larger sub-woofers that cost much more, and outperforms them in terms of transient fidelity and freedom from the colorations inherent in port-loaded subwoofer designs.

Please read through the Owners Manual and Set-up Guide to achieve the maximum enjoyment from your purchase.

Please write the serial number and purchase details of your Genesis S4/8 here for future reference.

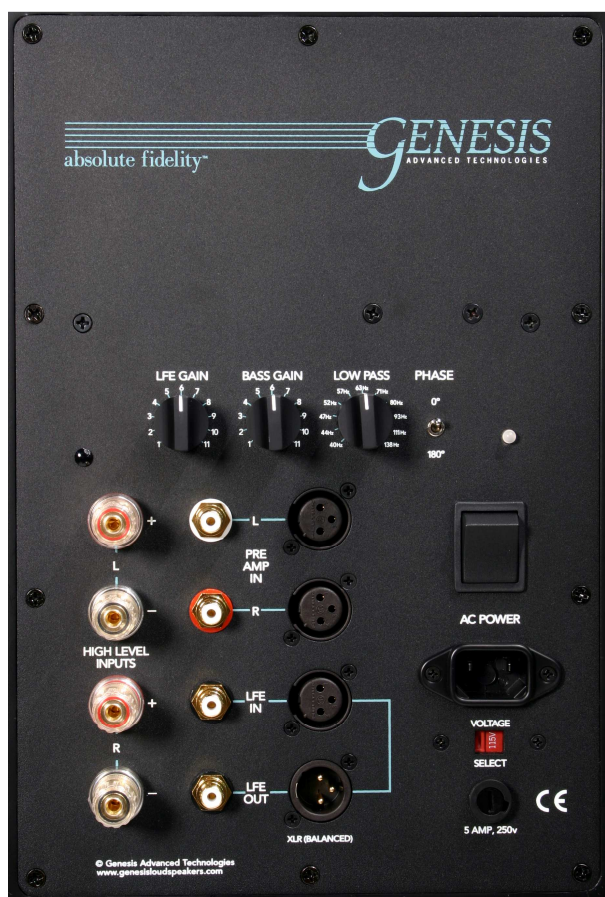
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## A Quick Start Set-up Guide

Now that you have your new Genesis ServoSub 4/8, we realize that you are eager to hook it up and start listening! Nevertheless, please read this quick start guide NOW before you begin setting it up.

### Safety Tips

The S4/8 is a powered subwoofer with a built-in amplifier: it needs to be connected to a power socket that is always on. Make sure that you are providing the correct voltage, and keep the S4/8 away from water and direct heat.



### Connections

There are two common options for hooking-up the S4/8 to your existing system. For dedicated music systems and bass extension of satellite speakers, we recommend connecting the high-level speaker binding posts on the S4/8 to your power amplifier's speaker outputs, or connect them to the "speaker through" binding posts on the associated speaker, using a short run of cable as a jumper.

Please note that the binding post inputs on the S4/8 are high impedance inputs. This means that you can connect as many of them as you like to the output of a power amplifier, and the amp will never "see" the load. This also means that you should use an interconnect-type cable to connect the S4/8 even if you use the high level inputs. Speaker cables are designed for low-impedance connections. Hence, unless it is a very short jumper, a thin, small interconnect-type cable is a better choice than a thick speaker-type cable.

The second option for connecting the S4/8 to your existing system is to hook it up to your preamp out using the line level inputs. In this case, if you have two outputs on your preamp, use one set for the power amp, and the second for the S4/8, avoiding a Y-connector if possible.

You can use a single S4/8 to augment a pair of speakers, as it provides for two high-level inputs.

For traditional subwoofer use in audio/video systems in multi-channel home theater applications, connect the line level LFE output of your processor to the LFE input on the S4/8.

Our unique LFE Blend™ technology allows you to use the S4/8 in BOTH your music system and your home theater system at the same time by using the high-level speaker inputs to augment the bass response of your satellite speakers and connecting your processor's LFE output to the LFE Input. You are able to blend the two signals together for better bass management of your listening room.

The S4/8's LFE out can be used to daisy-chain multiple Genesis subwoofers together for better control of the bass modes in your listening room. This makes bass management easier, and makes for tight, fast, articulate bass.

### **Placement of the Subwoofer**

One of the most common reasons to buy a subwoofer is to augment your existing loudspeakers when they do not provide enough bass for your liking. In general, the S4/8 is used to augment front main or center speakers in a multi-channel system, and would be placed near the center channel or in between two main front speakers.

In this case, you should also connect the LFE input of the S4/8 to the LFE/Subwoofer output of your processor (or daisy-chained from the nearest Genesis subwoofer with an LFE output). Since the S4/8 has speaker-level inputs for two channels, you can place a single sub between the two front speakers of your multi-channel system.

In a stereo system, you could place the S4/8 in between the left and right speaker and connect them to both. In general, it is never advisable to have your subwoofers placed symmetrically in a room. Hence, we recommend that it be placed nearer the right speaker.

### **Adjusting the Controls**

Locate the spec sheet for your existing main L/R loudspeakers or center channel, and adjust the Low Pass frequency on the S4/8 so it matches the -3dB point of your speaker's frequency response (If you can't find that the -3dB frequency, set the S4/8 to 63Hz – the 12 o'clock position on the knob – and tune by ear from there). For speakers of general sensitivity (around 88dB to 93dB), the Bass Gain and LFE Gain can also be set at the 12 o'clock position.

The Phase switch allows you to reverse the phase of the S4/8. By flipping between 0° and 180°, the correct position for this switch will be apparent by the greater low frequency output of the system.

*Note: Should your woofer amplifier unexpectedly turn off and you are unable to turn it back on, you may have overheated or over-driven the amplifier. It can take up to thirty minutes for the amplifier to cool down enough to turn back on.*

*Be patient. The two most common causes for this are poor ventilation and too much amplifier gain (ie, the amp is being driven too hard). If the amplifier is well ventilated and it still shuts down then you may have the volume control turned up too high. Refer to the section on increasing the low frequency response of your speakers without turning up the volume control.*

## Setting-up the S4/8

While it is relatively easy to add a subwoofer into your system and hear more bass, it is not as easy to integrate a subwoofer seamlessly into your system. The Genesis ServoSub 4/8 makes system integration far easier than most other subs because the servo system makes the S4/8's bass quick, clean and articulate. This means that no matter which main speakers you use, the S4/8 will integrate well with them; even fast electrostatic or magnetic planar speakers.

### Positioning and connecting the S4/8

When the S4/8 is used to augment the low-frequency response of a loudspeaker, place it as close to it as is practical.

In typical use, the S4/8 can be used to augment the low-frequency response of the Genesis 6.1c center channel. In this case, the G6.1c can even be placed *on top* of the S4/8. Because of the mass-balanced design, there is minimal vibration of the S4/8 cabinet caused by the woofers.

When the S4/8 is used to augment a stereo pair of speakers, place it in between the two speakers, and not too near the wall. In general, it is not advisable to place subwoofers symmetrically in a room. We recommend that the S4/8 be placed nearer the right loudspeaker. This is because in an orchestra (and also in a jazz band) the bass instruments are on the right.

### LFE Input

The Low Frequency Effects (LFE) input allows the S4/8 to be used for augmentation of center or main loudspeakers *as well as* for the reproduction of LFE for your home theater system. The LFE input **blends** the low frequency effects signal from the home theatre processor into the normal input signal on the subwoofer. We call this our LFE Blend™ technology.

The LFE input bypasses the internal crossover, and hence uses the home theatre processor's crossover. This means that the S4/8 can be used to augment center or front main speakers as well as deliver the LFE channel without resorting to digital bass management on the processor.

On the home theatre processor, set the front and center speakers to "LARGE" and sub-woofer to "YES". Then, connect the sub-woofer (LFE) line-level output from the processor to either the single-ended

RCA or balanced XLR “LFE IN” connector on the S4/8. Do not use both of these inputs at the same time.

We recommend that single-ended interconnects be no longer than 10 feet (3m). Hence, we have provided balanced LFE inputs. If your processor is further than 10 feet from the S4/8, please use a high-quality balanced cable.

If your processor has only single-ended outputs and is further than 10 feet from the S4/8, we recommend that you consider using an active (or passive) signal balancing device to convert the unbalanced output signal from your processor to a truly balanced signal. A truly balanced signal will give you the benefit of maximum noise rejection and maximum signal fidelity over long cable runs.

The unbalanced interconnect which connects your preamp to the balancing device should be shorter than 4.5 feet (1.5 meters). You can then use a balanced interconnects to connect the output of the signal-balancing device to the input of the S4/8.

An added benefit of the S4/8 is that the servo-amplifier incorporates an active signal-balancing device built in. This means that if your processor has only single-ended outputs, but you can place an S4/8 close enough to use a single-ended interconnect, then the balanced output of that S4/8 can be used to daisy chain to the rest of the system.

### **LFE Gain**

The S4/8 has a control for LFE GAIN that is separate from BASS GAIN. This allows you to have the S4/8 augment your surround speakers as well as deliver LFE around the room at the same time without conflicts. The usual way to control the level of the LFE output is to set the LFE gain to 6 – the twelve o’clock position – and then use the home theatre processor’s level control to dial in the level. However, different locations in the room may have different room gain in the bass frequencies. The LFE gain control allows you to tune each subwoofer for optimum balance.

### **LFE Output**

Along with the LFE input, the S4/8 has the unique capability of providing an LFE output. This buffered output can be used to daisy-chain the LFE signal from the S4/8 to the LFE inputs of other Genesis subwoofers including other S4/8’s, S2/12t’s or G928’s. Thus, it is possible to channel the LFE signal from your home theatre processor to one S4/8, and then from that to another, and another, and another!



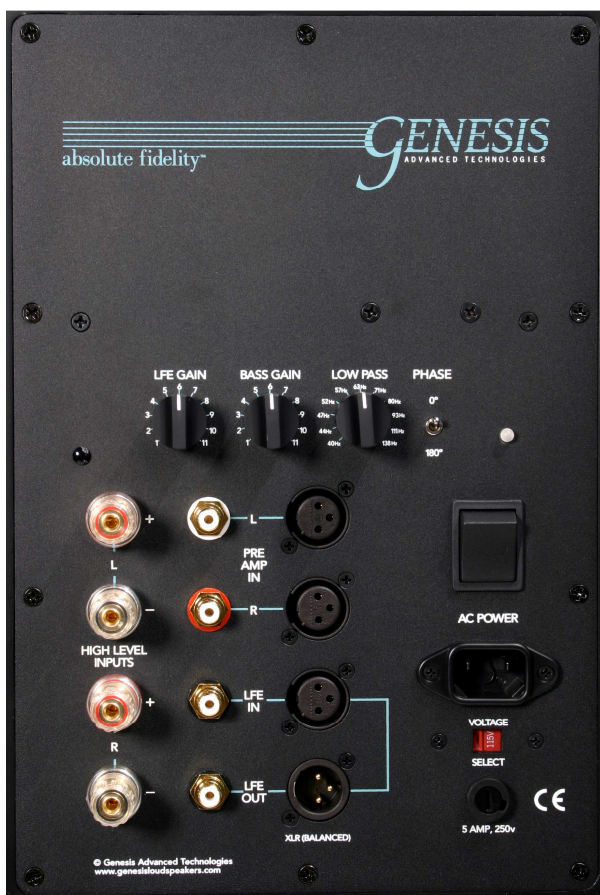
You can even use BOTH single-ended RCA and balanced XLR LFE outputs to daisy-chain even more subwoofers when either the single-ended input or the balanced input is used.

**In the case of bass and LFE, using more low frequency sources (not higher level) is better than using less.** The point is not to achieve a higher level of bass response but rather, by using multiple subwoofers to distribute the LFE signal around the room, dramatically reducing and evening-out room modes and increasing the bass capability of the system.

Distributing low frequency information is also helpful for reproduction of Multi-channel Music because you get incredible articulation and detail in the bass all around the room.

### Power

Make sure the ServoSub 4/8 is plugged into a wall outlet that is always on. The S4/8 has an auto-on feature and will automatically power up from “stand-by” when it detects a signal, and will switch itself to power saving after about 10 minutes of being idle.



We recommend against the use of an extension cord for providing AC power. If you are forced to use an extension cord, make certain that it is as heavy duty (a minimum wire thickness of 12 gauge) an extension cord as you can find. The S4/8 running at full tilt can draw up to 1200Watts from your power supply, so make sure that whatever you plug your subwoofer into can handle it!

### Speaker-level connections: High Level Inputs

Using a good quality speaker cable, connect the output of your power amplifier to the binding posts on the back of the S4/8. You may also connect the S4/8 to the binding posts on the back of your loudspeaker terminals if this is more convenient.

Make sure that you maintain proper polarity. This means that the plus (+)



terminal of your amplifier must be connected to the plus (+/red) terminal on the back of the S4/8, and the negative (-) terminal to the negative (-/white) terminal.

Using the high level inputs to feed the S4/8 power amplifier will not degrade the sound quality of either your loudspeaker or the subwoofer.

### **Line-level connections**

As an alternative, you can use the low-level inputs on the S4/8. Using a high quality interconnect cable, connect your preamplifier's output to the low level inputs on the subwoofer labeled PRE AMP IN.

We strongly recommend that you do not use single-ended interconnects longer than 10 feet (3.2 meters) to connect the preamplifier outputs to your subwoofer. On many preamplifiers, using an interconnect that is too long will negatively affect the performance of your preamplifier because of the high capacitance of the interconnect cable across the output of your preamplifier. This is why we provide balanced inputs on the S4/8. Balanced interconnects can be as long as you like.

If your preamplifier has only one set of balanced outputs and one set of unbalanced (RCA) type outputs, choose your first preference of connection for the amplifier that is driving your loudspeaker. Use the remaining set of outputs to feed the S4/8's amplifier.

Do not connect BOTH single-ended and balanced inputs to the S4/8 at the same time. You could over-drive the built-in amplifier, and void the warranty.

### **Phase Switch**

If the subwoofer is out of phase with the speakers they are used to augment, there will be some cancellation of the bass frequencies where they overlap. Some speakers are designed to be phase inverting (in particular those with 2<sup>nd</sup> order crossovers). There are also many power amplifiers that invert the phase of the incoming signal.

Because there are so many possible combinations, we recommend that you flip the switch between 0° and 180°. The correct position will be apparent from the greater amount of low-frequency output of your system.

If you have a phase inverting power amplifier and have inverted the phase on the subwoofer, AND you are using both line-level and speaker-level inputs, you must invert the phase of the speaker-level

inputs to the subwoofer. Connect the +ve speaker lead to the –ve input terminal, and connect the –ve speaker lead to the +ve input terminal.

## Making your system sound right

The ServoSub 4/8 subwoofer is perfect for use in 2-channel or multi-channel music and video applications. The setup for either is very similar and the goals should be quite the same too. In our opinion, the end goal of adding a high-end subwoofer should be to not “hear” the subwoofer work, but rather to add the appropriate amount of low bass that is currently missing in your system.

When listening to music, the full frequency range of the orchestra or rock band should be reproduced with proper dynamic range and realism, from the lowest notes of a pipe organ to the whack of the timpani or the pluck of the lowest string on a Fender bass. When listening to film soundtracks, the same goals should be sought after so that the results are both realistic and exciting; as the roar of jet planes rumble through your living room and prehistoric creatures shake the earth!

Fine-tuning an audio or video system is an art that takes time and patience. It can be one of the most rewarding learning experiences you will encounter during your pursuit and enjoyment of high-fidelity music or video reproduction.

One of the best pieces of advice we can offer is that you take advantage of the ear’s ability to identify similarities in sound. This ability is useful in fine-tuning your system because, if every recording you listen to (or every video you watch) has a similarity of sound (too much or too little of a certain frequency for instance), then you can be fairly certain that you have yet to perfect your setup. Keep at it and remember to enjoy your music and video as you work on perfecting your setup.

One idea that we would like to suggest is that you set the S4/8’s bass gain controls for music, and use your processor to turn it up or down for home theater. That way, you have a subwoofer that will take care of all your needs.

With proper setup and placement, you can achieve stunning realism, and musically correct and natural bass – not just more bass.



## The Main Controls

The S4/8 subwoofer has two controls that you will use to make your system (and that includes the room), sound right. The first is the gain control of the woofer amplifier. This adjusts the volume at which the subwoofer plays.

The gain can be adjusted from 1 to 11.

The second control is the low pass filter. This adjusts the crossover frequency for the built-in 12dB per octave variable crossover. The crossover frequency can be adjusted from 40Hz to 138Hz, where frequencies below the number set are sent to the subwoofer, and frequencies above are rejected.

To begin, adjust the low pass filter to 63Hz and set the gain control to 6 (both at the 12 o'clock position). At this point, you can turn on the woofer amplifier.

## Tuning the system in

Set up your subwoofers one at a time in conjunction with the speaker that you are using them to augment. If you are using a single subwoofer to augment two different loudspeakers, adjust the subwoofer with one speaker at a time.

Set the low pass filter to the -3dB frequency of your main speakers, and the gain control to 6, and start from there. If you don't know the 3dB point of your speakers, start working from a low-pass filter frequency of 63Hz. This will work for most small speakers.

We suggest that you start with a single vocal track, with instrumental accompaniment, that you are very familiar with. The sound of the human voice is more easily recognizable than many instruments and is the least complex sound to deal with. Run a mono full-range signal to the speaker that you have the S4/8 connected to.

Turn the gain control of the subwoofer amplifier up or down until the voice sounds correct. Concentrate on the mid bass regions (as opposed to the very low bass in your recording), to achieve a natural blend. The voice and the music accompaniment should sound as if it were cut from one cloth, not separate.

If the voice sounds "thin" or does not have enough "chest" to its sound, turn the S4/8's bass gain control up until it does. You may also want to

experiment with increasing or decreasing the low pass filter control. This control will raise or lower the frequency cutoff point of the woofer.

If you find that the sound is “thin” or lacking in mid bass, and that turning the gain control up to “thicken” the sound creates too much low bass, this is a good indication that you may want to turn the low pass filter up to a higher frequency instead. This will extend the response of the S4/8 into the upper bass regions without affecting the low bass level.

Next, check the S4/8 using more than just a voice. Select some music that you know to have good deep bass, a symphonic piece of music if you can, or use a natural bass instrument for your guide. Try to make it sound real. You may have to return to the vocal track from time to time to make sure you have not gone too far in one direction.

If, at this point, the overall sound seems to be lacking in mid bass, turn the low pass filter to a higher position or, alternately, position the main speakers closer together in order to achieve better mid bass coupling between the main speakers. If the overall sound is too “fat” turn the low pass filter down or adjust the gain. At this point we suggest you use only the low pass filter control until you get to the refinement stage.

### **Low bass**

If you find that there isn't enough deep bass in the overall sound of the system, your first remedy is the gain control on the S4/8 amplifier. This has several limitations. First, turned up too high, it may result in some distortion on very low frequencies.

Secondly, you may make the mid bass produced by the top of the woofer out of proportion with the mid bass produced by the bottom-end of your main speakers. This would make your system sound “boomy” in the mid bass regions.

A good rule of thumb is to first adjust the gain control of the subwoofer for proper mid bass response rather than low bass. The theory is that if the mid bass response is correct, then the low bass response should be very close to correct.

A good balance between proper low bass extension and a deep and spacious soundstage needs to be established to optimize your new speaker's performance.

### **Tuning for Low Frequency Effects (LFE)**

The LFE input has a separate gain structure and bypasses the crossover in the subwoofer. Hence, it should be set-up separately from the main speaker augmentation function.

A simple way to set up the S4/8 for LFE is to use the test and level signal available in most home theater processors and multi-channel players, and test discs. Many DVD's include a THX calibration option that has a set of test tones for speaker level adjustment.

Using a high quality sound pressure meter, set the LFE gain so that the S4/8 matches the volume of the main speakers.

If you are using multiple subwoofers, you will need to set each subwoofer in turn. As each location of the subwoofer may have different bass levels caused by room-related gain, adjust each separately. To do this, you first set the LFE gain on all your subwoofers to 1 (fully anti-clockwise).

Then, using a LFE test tone and a sound pressure meter set the LFE gain on the first subwoofer to 3dB down (for 3 subwoofers, 5dB down if using 5 subwoofers) from the reference volume of the main speakers. Write down the setting, and then turn the LFE gain back to zero.

Go to the next subwoofer and repeat the process until you have the LFE GAIN settings of all your subwoofers. When you have all the settings, go to each subwoofer and turn up the LFE GAIN to the setting you noted down. Re-check the bass volume with all subwoofers on.

If the bass response is too high or too low, use the subwoofer level setting on the processor to match the LFE volume to the volume of the rest of the speakers – or do it all again using a higher or lower setting for each subwoofer.

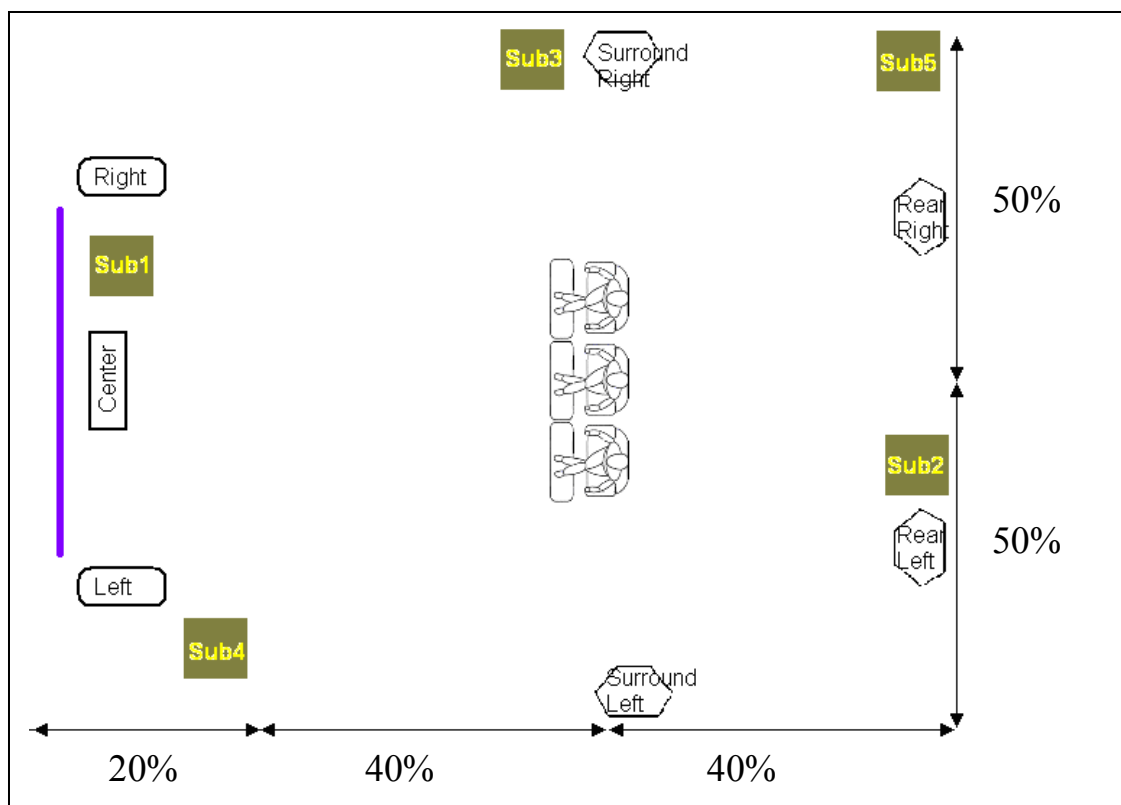
### **Placing and Connecting Multiple Subwoofers**

The combination of LFE Blend™ and daisy-chained LFE in all Genesis ServoSub™ models means great flexibility. They are all readily suited to multiple subwoofer installations when used in a multi-channel music or home theater system. One Genesis ServoSub can be used to extend the frequency response of any two main speakers, AND at the same time deliver the LFE channel.

These placement guidelines are only suggestions. Depending on your room and the speakers you have, you may want to place them differently. Any combination of Genesis subwoofers may be used.

With one subwoofer, place it in the front of the room between the center channel and the right speaker. If your main left/right speakers are full-range, and the center channel is not, use the subwoofer to augment the center channel as well as to deliver the LFE channel.

The second subwoofer can be placed in the back of the room. Daisy-chain the LFE from the front subwoofer, and use it also to augment the two rear (or two surround) channels.



When the third LFE subwoofer is added, place it on one sidewall. If you have a 7.1-channel system, use it to also augment the two right surround and rear channels, and rewire subwoofer #2 to augment the two left surround and rear channels.

Subwoofer #4 is added to the front left of the room. Once this is done, subwoofer #1 can be used to augment the center channel and the right channel, and subwoofer #4 to augment the left channel as well as LFE.



The final touch will be a fifth subwoofer added into one corner of the room. This will excite all room modes equally, so pick any convenient corner. In asymmetric rooms, find a corner that makes the system sound smoothest. This subwoofer can be used to also augment the nearest speaker to make it full-range.

**Notes:**

1. Bass frequencies are not localizable below 60Hz. With a wavelength of over 18 feet (6 meters), it is possible to use a subwoofer with the low-pass set at 60Hz to augment nearly any loudspeaker in a reasonably sized room (longest dimension < 18 feet).
2. The response of any subwoofer (or even the bass response of any loudspeaker) is very placement dependent. Whether it is placed against a wall, into a corner, or on a pedestal will change its response and gain. Hence, it will be necessary to tune EACH subwoofer individually before tuning them all together.
3. Each subwoofer in a multi-LFE installation will have a different frequency response. Each will excite different room modes depending on positioning. Multiple subwoofers will more likely smooth out such bass problems, however, while theoretically more subwoofers are better, five is really all you need in a reasonably sized room.
4. Sound waves are 3-dimensional. Hence, placing subwoofers at differing heights in the room will also help even out the bass response of the room.

For even **more** information on setting up multiple subwoofers, check out the Genesis white paper "Setting up an absolute surround distributed bass multi-channel music/movie system".

Good luck!

## The Technology

### The Servo Advantage

Very few loudspeakers use servo drive, either because most designers think that it is too difficult to design, too expensive, or because of the extraordinary demands a servo system makes on the amplifier and the transducer. However, the Chief Scientist of Genesis, Arnie Nudell, first introduced the servo system in the legendary Infinity Servo Statik One in 1968(!) – so we know how to design and build servo systems.

The concept of our servo bass system is an easy one to understand: It employs an accelerometer as a sensor to constantly monitor the movement of the woofer cone, and instantaneously compares it to the input signal. This comparison circuit identifies any deviation from the ideal and instantaneously applies a corrective signal to compensate for the deviation; virtually eliminating inherent woofer distortion.

As an example, when you have a high-impact, low-bass signal that starts and stops suddenly (for example a kick drum), the inertia of the woofer cone causes the cone to be slow to begin moving. Once the cone is in motion, the momentum of the cone causes it to keep moving - even after the output signal of the amplifier has stopped.

The sonic result is overhang, bloat, lack of tautness and definition, and a blurring of dynamic impact. With the servo system, the circuit senses that the woofer is not moving as fast as it should, and applies more current to make it move faster. When the signal stops, it detects that the woofer is still moving when it shouldn't, and applies a counter-signal to cause the the woofer to stop faster and more effectively than normal circuitry would.

Thus, the servo-drive reduces distortion and improves transient response by making the woofer seem mass-less. Typical non-servo woofer systems have distortion levels that exceed 10% at even moderate levels. The Genesis servo bass system reduces this distortion to below one percent at almost any output level. Moreover, it drives the woofer to constant acceleration, which makes its frequency response nearly flat!

### 500W Class-D Switching Amplifier

The servo system places extraordinary demands on the amplifier because it uses enormous amounts of current to make the woofer follow the signal. This means that the amplifier used must deliver huge amounts of clean power.

The best amplifier for this application is a Class-D switching amplifier. One of the reasons a Class-D amplifier is optimum for this application is that it has a dramatically increased efficiency, especially at lower frequencies. A typical Class A/B amplifier is only 50% efficient. A Class-D amplifier, on the other hand, can be 90% efficient. A Class-D amp also puts out more power with less heat and less power consumption; ideal for use as a subwoofer amplifier.

The S4/8 uses a proprietary, ultra-efficient, discrete MOSFET switching amplifier with output capability of up to a full kilowatt. The design provides extraordinary control with high-damping and great thermal stability, so that you can play the most demanding sources continuously at high volume.

### **The Transducers**

The transducer used in a servo system must be strong enough to withstand the high current approach of the servo, and yet delicate and light enough to react extremely quickly. The S4/8 subwoofer features four 8-inch woofers that are designed with ribbed aluminum cones, that are lightweight and yet inherently stiff. Our aluminum cones exhibit no resonance or cone flexure anywhere near the frequencies at which the subwoofer operates. The lowest break-up mode (where there can be any chance of distortion at all) is at 6,000Hz – far above the 25Hz to 120Hz frequency response of the S4/8. Therefore, the driver is a perfect piston within the frequencies used, and exhibits very low cone-breakup distortion.

### **Specifications**

- Dimensions: 24" x 22" x 11 ½" (w x h x d)  
(610mm x 559mm x 292mm)
- Frequency Response: 20Hz to 120Hz +/- 1dB  
16Hz to 180Hz -3dB, +2dB
- Weight: 87.5 lbs (39.8 kg)
- Inputs: High-level left and right with 5-way  
binding posts;  
Low-level left and right, single-ended  
RCA and balanced XLR;  
LFE low-level mono single-ended RCA  
and balanced XLR
- Outputs: LFE low-level mono buffered single-  
ended RCA and balanced XLR
- Controls: Variable low-pass filter  
Variable bass gain control  
Variable LFE gain control  
Phase switch 0°, 180°
- Finish: Premium Rosewood  
European Maple